IMPACT Instrumentation, Inc.

27 Fairfield Place, West Caldwell, NJ 07006
P.O. Box 508, West Caldwell, NJ 07007-0508

Model 750 Ventilator Performance Test Procedures

Purpose

This procedure covers the steps necessary to test the performance of the Model 750 Portable Ventilator.

Equipment Required:

Operation/Service Manual (P/N: 906-0750-02 for ventilators with serial numbers "9306018" and below or 906-0750-04 for ventilators with serial numbers "9306019 and above.)
Michigan Instruments Dual Adult Test Lung or equivalent
Digital Voltmeter
50 PSI medical-grade oxygen source w/Dual stage regulator
Variable Voltage Power Supply (15V, 2A)
RT-200 or equivalent

NOTE: Use 100% medical-grade O_2 and a dual stage regulator for all testing. Testing should be performed with a reusable patient circuit. It will be necessary to "T" transducer hose to complete all testing. Use the included table to record all test results.

PROCEDURE

1. Connect all hoses and tubing (See Operation/Service Manual section viii).
2. Calibrate pressure transducer (See Operation/Service Manual section 3-4). Record software version # (on Digital Bar Graph, if 7^{th} LED is lit from bottom version # is "1.01", otherwise version # is "1.00").
3. Turn MODE switch to "CTRL" and set RT-200 for O_2 flow (Function #35).
4. Connect patient valve to RT-200's "High Flow Range" port.
5. While depressing Manual Trigger, adjust dual stage regulator to 50 PSI while simultaneously adjusting Flow Adjust knob on Model 750 for 20LPM (as displayed on the RT-200).
6. Set Model 750 RATE for 16 breaths per minute, INSP for 1.0 seconds, FLOW ADJUST to 100 LPM, and HIGH and LOW pressure alarms to "Off".
7. Record maximum O_2 flow.
8. Set RT-200 for O_2 volume (Function #41).
9. Set Flow Adjust to maximum volume (1660ml) and record value. Set and record measured values at 1000ml, 500ml and 0ml (let ventilator cycle at least twice before recording any value).
10. Perform the following test for ventilators that include the demand valve feature. Set RT-200 for O_2 flow (Function #35) and turn MODE switch to "SIMV". Connect patient valve to adult lung. Remove demand valve tubing from patient valve and connect tubing to the RT-200 "High Flow Range" port using an adapter. Simulate an inspiratory effort by lifting lung. Verify that demand valve activates and record flow rate. Reconnect demand valve tubing to patient valve.

Tel: 973.882.1212 Fax: 973.882.4993
Web Site & E-Mail: http://www.impactinstrumentation.com

11. Set Model 750 RATE for 150 breaths per minute, INSP for .1 seconds, Flow Adjust to 100LPM, and MODE switch to CTRL.

12. Record battery pack voltage.

13. Connect external power. Record charging current and verify continuous illumination of EXT POWER LED. Disconnect battery pack and verify that ventilator operates from external power. Reconnect battery pack.

14. Unplug external power from wall outlet and verify "External Power Low/Fail" Alarm (LED and Buzzer). Reconnect external power.

15. Set Model 750 RATE for 10 breaths per minute, INSP for 1.0 seconds, Flow Adjust to 1000ml/sec, and MODE switch to CTRL. Set RT-200 for pressure (Function #12).

16. "T" transducer hose and attach to RT-200 "Low Pressure Range", "P+". Attach patient valve to Lung, set PEEP valve for ≈10cm/H_2O and attach to patient valve's exhalation port. Press PEEP OFF/ON pushbutton. Allow ventilator to determine PEEP value then adjust RATE to 1 BPM. Set flow adjust to 100LPM. Monitor pressure leak on RT-200. Criteria for acceptable leakage is < 1 cm H_2O in 5 sec. Remove PEEP valve and disable PEEP (Press PEEP OFF/ON pushbutton).

17. Attach syringe to one leg of "T" on transducer line (transducer tubing from patient valve). Compare Model 750 pressure readings (P_{aw}) with RT-200 @10, 25, 50, 75, and 91cm/H_2O (should reach top LED). "FAL" should occur at ≈95cmH_2O. (Tolerance is ±3cm/H_2O.). Verify buzzer during "FAL" condition. Reconnect transducer tubing to barb on patient valve.

18. Reboot ventilator and toggle all membrane panel pushbutton switches (at least twice consecutively). Look for shorts with other switches and verify active LEDs. Turn RATE, INSP, HIGH and LOW adjustment knobs from minimum to maximum. Verify a smooth scrolling readout and end ranges on all knobs. Depress MANUAL TRIGGER. Verify that O_2 flows and INSPIRATION LED illuminates with each press in all modes.

19. Set Model 750 RATE for 16 breaths per minute, INSP for 1.0 seconds, Flow Adjust to 500ml/sec., and MODE switch to CTRL.

20. With patient valve disconnected from lung, verify "Low Pressure/Disconnect" alarm (LED and buzzer).

21. Depress Mute Cancel pushbutton. Verify that Disconnect alarm mutes and that "Alarm Mute/Cancel" LED remains active.

22. Attach patient valve to lung "Alarm and Mute/Cancel" LED should self-cancel.

23. Set Flow Adjust to 1000ml/sec. Verify that peak pressure (PEAK) is ≈ 24cm H_2O. Readjust Flow Adjust knob if necessary.

24. Set LOW pressure alarm setpoint to 30cmH_20 or a value above PEAK pressure.

25. Verify that "LOW PRESSURE/DISCONNECT" alarm (LED and buzzer) activates.

26. Set LOW pressure alarm setpoint to OFF. Set HIGH pressure alarm setpoint to 15cmH_20 or a value below PEAK pressure.

27. Verify that HIGH PRESSURE alarm (LED and buzzer) activates after ≈4 breaths.

28. Set HIGH pressure alarm setpoint to OFF. Verify that alarm cancels after 4 breaths.

29. Set MODE switch to ASSIST and RATE to 1 BPM.

30. Verify that "APNEA" alarm (LED and buzzer) activates after ≈19 seconds. Verify that rate defaults to 12BPM. Check with RT-200 Function #45 and patient valve connected to "High Flow Range" port. Cancel APNEA alarm after verification.

31. Set MODE switch to CTRL, RATE to 150 BPM, and INSP to .1

Impact Instrumentation, Inc. - P.O. Box 508 - West Caldwell, NJ 07007-0508 Tel: 973.882.1212 Fax: 973.882.4993

32. Unplug external power. Detach battery pack from ventilator and attach Power Supply at 12.50 volts to battery connector on ventilator. Slowly lower the voltage until a "BATTERY LOW/FAIL" alarm occurs (LED and buzzer). Verify that voltage is between 11.95 and 12.45 volts. Continue to adjust voltage down until ventilator turns off. Verify that shut down occurs between 10.95 and 11.45 volts.

Test Data	
MAX Flow (90 LPM - 110 LPM)	LPM
MAX Volume (1530ml - 1870ml)	ml
1000 (900ml - 1100ml)	ml
500 (450ml - 550ml)	ml
0 (0ml - 0ml)	ml
Demand Flow (54 LPM - 66 LPM)	LPM
Software Version	
Charging Current (5mA - 200mA)	mA
Battery Pack Voltage (11.8V - 14.5V)	V
"Battery Low/Fail" Alarm (11.95V - 12.45V)	V
Shut Down Alarm (10.95V - 11.45V)	V

Impact Instrumentation, Inc. - P.O. Box 508 - West Caldwell, NJ 07007-0508 Tel: 973.882.1212 Fax: 973.882.4993